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AUTHOR Hooks, Gregory
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ABSTRACT

The erosion of the credibility of the classical diffusion paradigm by recent challenges to its fundamental assumptions has resulted in a "paradigmatic crisis" as related to research on the diffusion of agricultural innovations. Such basic assumptions as that of a harmonious and cooperative society and of agricultural research guided by endogenous logic and funded by neutral polity have been criticized by the conflict theorists who support a conflict model of society and the essentially political nature of agricultural development and diffusion. Empirical evidence appears to support the conflict theorists. Various research efforts have demonstrated that agricultural research is an area of conflict and biases; that U.S. technological development is not universally beneficial; and that the market position of the potential adoptor and the objective attributes of technologies (scale, capital requirements) are more important in the innovation diffusion process than communications variables. The challenges do not entirely falsify the classical diffusion paradigm but rather raise questions that cannot go unanswered and, in the process, cast doubt on the usefulness of the paradigm in social inquiry. The resolution of the crisis may lie in an alternative perspective of far larger scope which encompases the recent criticisms of the paradigm. (SB)

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THE CLASSICAL DIFFUSION PARADIGM IN CRISIS

by

Gregory Hooks

Department of Agricultural Economics and Rural Sociology

The Ohio State University

Columbus, Ohio 43210

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The Crisis of the Classical Diffusion Paradigm

Throughout the 1950's and 1960's, a considerable portion of the time and energy of rural sociologists was devoted to investigating the diffusion of agricultural innovations among farmers (Goss, 1979). In thousands of studies, rural sociologists identified correlates of adoption behavior. By virtue of this research, rural sociologists were able to identify variables related to adoption rates, innovativeness (i.e., relative earliness of adoption) and effective diffusion techniques. Based on the results of these studies, more efficient diffusion campaigns were designed and implemented--in the U.S. and world wide. The impact of diffusionist thought and diffusionist studies was felt in the intellectual sphere and in the "real world" via the design and implementation of diffusion campaigns (Rogers and Shoemaker, 1971).

The classical diffusion paradigm served to organize research into the diffusion of agricultural innovations by pointing to areas of needed research and to the methods of pursuing that research. Social scientists were able to make some common basic assumptions concerning the nature of social reality in general and the nature of the diffusion process more specifically. In making these common assumptions, proponents of the classical diffusion paradigm were able to move past abstract debates to pursue research on very specific and practical aspects of the diffusion process.

In recent years, the basic assumptions that serve as the foundation for the classical diffusion paradigm have been challenged. In light of these criticisms the paradigm's credibility has eroded. Without the foundation of common assumptions that the classical diffusion paradigm provided, research into the diffusion of agricultural innovations proves problematic. The locus of the problem and the methodology employed in the investigation have once again become issues of heated debate.

Kuhn (1962) refers to the erosion of a paradigm's credibility as a "paradigmatic crisis." This paper will discuss the classical diffusion paradigm and the criticisms of it. The objective is to make an evaluation as to the existence and severity of a paradigmatic crisis in diffusion research. Based on this discussion, some suggestions will be offered as to what needs to be done.

This paper is divided into four sections. Section 1 begins the discussion by clarifying essential terms: model, theory, and paradigm. These words, so common in the sociological vocabulary, are used in a variety of manners by different authors. At the outset of this discussion, these terms will be defined and their use specified. In turn, the criteria upon which each (model, theory and paradigm) is deemed useful in sociological research will be explored. In Section 2, the models and theories that comprise the classical diffusion paradigm will be discussed. The logic, methodology and research of the classical diffusion paradigm will be presented as well. In this discussion, the basic assumptions of the classical diffusion paradigm and a preliminary statements as to the implications of making these assumptions is offered.

Section 3 will present the criticisms of the classical diffusion paradigm that have emerged in recent years. Authors critical of the classical diffusion paradigm have advanced alternative models and theories of social reality. These alternative positions will be presented en route to specifying the critiques and their implications for the classical diffusion paradigm. Section 4 will build on previous discussions and summarize empirical evidence that supports the positions advanced by critics of the classical diffusion paradigm. Section 5 will evaluate the criticisms of the classical diffusion paradigm and make a statement concerning the utility of that paradigm. This evaluation of the classical diffusion paradigm is not simply a statement of the truthfulness of that paradigm. It is rather an evaluation of the paradigm's utility in guiding future research. In concluding remarks, the criticisms and evaluations of the classical diffusion paradigm will be reviewed in an effort to determine what needs to be done.

Section 1

In this section, a definition of three terms (model, theory and paradigm) will be offered, beginning with model. The discussion is not specific to the classical diffusion model. Instead, it will offer some preliminary clarifications to permit a more lucid presentation of the diffusionist position.

Generally speaking, a model may be defined as "a non-verbal description of a thing" (Brodbeck, 1968, p. 579). Brodbeck (1968) draws a parallel between a toy train, which represents an actual locomotive, and a model in the social sciences, which represents (i.e., describes non-verbally) a social theory. In each instance, the two conditions of isomorphism are met:

1. "There is a one-to-one correspondence between elements of the model and the thing it represents."
2. "Certain relations are preserved." (Brodbeck, 1968, p. 580).

For a model in the social sciences, there must be a one-to-one correspondence between elements of the model and those of a social theory. Further, the relations among elements of the model must correspond to the laws of a theory. Thus, a definition of a model may be made specific to the social sciences. A model in the social sciences is an isomorph of social theory in the sense that it represents the form of the laws of that theory (Brodbeck, 1968).

From this definition, some implications are deducible. A model, in and of itself, says nothing of social reality. Rather, it is a symbolic form, useful for communicating the structure and the logic of a social theory, or several theories. Therefore, the evaluation of a model does not hinge on its truthfulness or accuracy, but on its usefulness in sociological theorizing (Kaplan, 1964).

According to the arguments presented here, models are evaluated on the basis of pragmatic criteria (i.e., according to the functions they serve). Specifically, models may serve any one of the following functions:

1. Data Organization--Models make specific and conscious the logic of a theory. In the course of sociological investigation, this may prove useful in avoiding confusion and self-deception while addressing complicated social phenomena.
2. More Effective Communication of Ideas--By stripping social theories to their skeletal logic, social scientists may follow and appreciate the efforts of others. Social theories, tending towards verbal as opposed to symbolic representation, may well benefit from the removal of this verbal covering and exposure of their essential logic.
3. Manipulation of Concept--As models permit social scientists to discard the often unwieldy trappings of social theories, they may permit scientists to experiment with basic concepts in a less constrained manner (Kaplan, 1964).

This list does not exhaust all possibilities, but does include some of the more important functions a model may serve. The evaluation of a model, then, is on the basis of its meeting the conditions as an isomorph and in its utility in sociological investigation. The evaluation of a model is not based on intrinsic qualities of the model, but on the degree to which its basic elements and their interrelations are appropriate for an investigation of a given social phenomenon. To make such an evaluation, a consideration of the content of the social theory structured by the model is necessary. To that topic, social theory, this discussion now turns.

A theory may be defined as a set of concepts and propositions, systematically interrelated and purporting to explain a given reality.[1] In the case of a social theory, that given reality is a social reality. The definition offered is composed of two parts: one specifying the content of a theory, the second identifying its explanatory function. Each will be discussed, beginning with content.

Social theories include sociological concepts (i.e., class, power, etc.) and propositions as to their interrelations. The defining characteristic of a particular theory is not so much the assembly of a set of propositions as it is the systematic interrelationships among the propositions. As a result of systematic interrelation, propositions of a theory have greater power and more precise meanings than they have independently. In this regard, a model may represent the form and logic of a theory, while the theory provides content specific to social reality.

The second part of the above definition refers to the functional aspect of social theories--they purport to explain something of social reality. This demands, first of all, that a theory's propositions say something truthful about social reality. Beyond that, a theory must prove useful to social scientists in the course of inquiry. In this regard, theory should help organize and interpret an otherwise confusing body of facts and laws (Kaplan, 1964).

Adopting the pragmatic position put forth by Kaplan (1964), theories may be evaluated according to their utility in sociological investigations. In addition to their truthfulness or accuracy concerning social reality, theories may be compared in several dimensions that tap their usefulness to social scientists:

1. Economy of Thought--The degree to which a given theory reduces the effort required to explain or understand social phenomena is an indicator of its utility in investigation.
2. Clarifying and Interpreting Social Phenomena--Through systematically interrelating what were once autonomous laws and facts, theories give each greater power and clarity. Theories vary in the degree to which their component laws are integrated and consistent with one another. Those theories exhibiting greater integration and consistency tend to be of greater utility in sociological investigations.
3. Derivation of New Laws and Propositions--Based on an existing set of laws and propositions, others may be deduced. Through this process useful areas of investigation may be identified and pursued in a fruitful manner. Those theories that are more productive of useful propositions are relatively superior, from a pragmatic standpoint.

The construction and evaluation of a theory is not done a priori but is a process that continues throughout investigation (Kaplan, 1964). In the course of investigation, identifying and manipulating the model underlying the theory may or may not prove a fruitful strategy for economizing thought, clarifying and interpreting social phenomena, or for deducing new laws. Such decisions must be made in the course of sociological investigation, and not beforehand.

Finally, the discussion turns to the paradigm, which may be defined as a model so powerful that it organizes theory and indicates an approach to methodology.[2] A paradigm, then, may consist of a model and a theory, or several of each. Paradigms are useful in interpreting existing research and guiding future sociological investigation. Like a theory, a paradigm must first say something truthful before proving its utility in sociological investigation.

A dominant paradigm is one which organizes an entire discipline or topic area. Kuhn (1962) argues that the ascendancy of a dominant paradigm is in large part a social phenomena. It is a result of scientists agreeing on the basic theoretical foundation of a paradigm and pursuing normal scientific investigation to add detail to its basic assertions. The utility of a paradigm depends on its ability to reduce continued debate over meta-theoretical issues that precludes concrete investigations. Once a paradigm is accepted, such debates may be set aside and concrete studies pursued.

A paradigm's utility is a function of its ability to interpret social reality and to direct further inquiry into a given phenomena. Kuhn (1962) recounts examples of the rise and fall of paradigms. For years, decades, and potentially centuries, a given paradigm may dominate scientific thought in one area, only to be discredited in a subsequent period. A paradigm respected as the subtlest or scientific thought in one period may come to be viewed as clearly false, and in the social sciences potentially as ideology, in a later period.

The erosion of a paradigm's dominance is in one sense a social phenomena. When scientists refuse, or are unable, to use a paradigm in their research efforts, it is no longer useful. However, the scientist's evaluation is based on objective factors. As a paradigm is proven inaccurate or restricts the investigation to relatively trivial issues, its utility is reduced in terms of objective criteria. The emergence of anomolies (i.e., findings inconsistent with the hypotheses of the paradigm) does not inevitably lead to the fall of the dominant paradigm. If, however, the anomolies that emerge contradict the very basic assumptions of the paradigm, or if they persist over a long period of time, the usefulness of the paradigm is severely eroded. With the emergence of alternative paradigms that prove capable of explaining given phenomena better than the dominant paradigm (i.e., able to explain and integrate the anomolies) the fall of the dominant paradigm becomes much more probable (Kuhn, 1962).

Section 2

In this section, the models, theories, and methodologies that comprise the classical diffusion paradigm are presented. It is argued that there are two models and two theories in the classical diffusion paradigm: one of society in general, and a complementary one of the diffusion process. Specifying the models and theories in the classical diffusion paradigm will assist the present inquiry by making conscious and observable the fundamental assumptions of diffusionists. When presenting criticisms of the classical diffusion paradigm in Section 3, it will be possible to select criticisms that challenge the basic assumptions of the paradigm, thereby reducing tangential discussions.

To a certain extent, identifying the diffusionists' model and theory of society is somewhat artificial. Throughout the 1950's and 1960's, rural sociological investigation in general, and diffusionist studies in specific, have been characterized as atheoretical if not anti-theoretical (Newby, 1980; Rogers and Shoemaker, 1971).[3] Diffusionist research is guided by a theory of society, however, even if that theory is neither rigorously constructed nor in the forefront of the investigator's thoughts. The questions asked, the propositions put forth, and the methods used in pursuing investigation reflect an intuitive theory and model. Further, major works in the diffusionist tradition (Rogers and Shoemaker, 1971), indicate adherence to a structural functionalist position (Hechter, 1975).[4] It is argued here that diffusionists adopted a structural functionalist position which served as the theory and the model of society for the classical diffusion paradigm.

The models comprising the classical diffusion paradigm will be presented briefly, first of society in general, and then of the diffusion process specifically. The structural functionalist-based model of society used by diffusionists develops the notion that society may be viewed as an isomorph of an organism (Hechter, 1975; Horton and Leslie, 1960; Reynolds and Henslin, 1973; Havens, 1975). The elements of the organismic model are:

1. It is a distinct system with clear boundaries separating it from other entities in its environment.
2. It is made up of differentiated units.

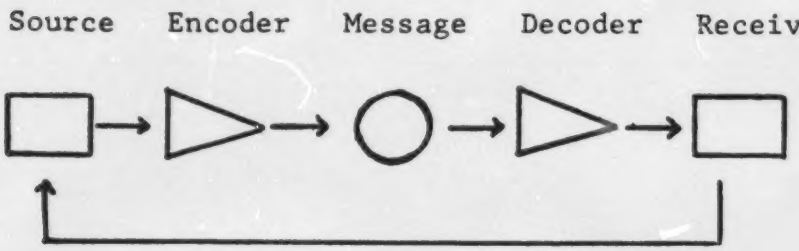
3. There is interdependence among the units identified in No. 2.
4. The whole exhibits synergy (i.e., the whole is somehow more and different than the sum of its parts). There is an interdependency between the whole and the units comprising it.
5. It exhibits unilinear development, often evolutionary.

From the organismic model, some implications may be deduced. Based on points No. 3 and No. 4, it may be concluded that the survival of the whole depends on the satisfactory functioning of key units. At the same time, the survival of units depends on the well-being of the whole and of other units. This, in turn, points to the direction of unilinear development asserted in point No. 5. To the extent the organism and its units function effectively, the direction of development tends to be positive. The dysfunction of key units, however, threatens the entire system and the various units. At this point, the model is not specific to society; it is an isomorph of a variety of living things and of a variety of social theories. The discussion returns to these issues when the topic turns to social theories in the classical diffusion paradigm. For now, the classical paradigm's model of diffusion is presented.

The classical diffusion paradigm uses a communications model originally created for electrical engineering by Shannon and Weaver (1949). It is made up of the following elements:

1. Source.
2. Encoder.
3. Message.
4. Channel.
5. Decoder.
6. Receiver.
7. Feedback (Berlo, 1960).

The relationship among these elements may be viewed diagrammatically:



The channel is represented by the arrows that run between elements from the source to the receiver. Feedback is designated by the lower arrow leading from the receiver back to the source.

In this model, the source encodes a message and sends it, via a channel and a decoder, to the receiver. The receiver may in turn affect the source by way of feedback (i.e., sending a message back via another channel). The model was created to study the efficiency of various sources, messages, and channels in eliciting a desired response from the receiver (Shannon and Weaver, 1949). The model proved useful in electrical engineering where the model's key assumptions were clearly met:

1. The total number of choices available to the source are known.
2. The response of the receiver is observable.
3. The cause of the response may be attributed to the source (Darnell and Brockriede, 1976).

Because of the model's utility, power, and simplicity in electrical engineering, it gained popularity among social scientists in a variety of forms. Among the forms it took was that found in the classical diffusion paradigm. In a later discussion the specific nature of that form of the Shannon/Weaver model will be addressed.

Parallel to the order of presentation of models, discussion of the classical diffusion paradigm's theory of society will precede discussion of its theory of diffusion per se. Returning to the organismic model presented previously, the social content of the theory will be explored. First, the one-to-one correspondence among elements of the theory and model will be presented, then the key relationships that are preserved in the theory will be discussed. In the model, the key elements are a system with distinct boundaries, differentiated though interdependent units, and distinct and separate from the environment in which it exists. In the social theory of the classical diffusion paradigm, elements parallel to those of the model are:

1. A social system with distinct boundaries separating it from its environment and other social systems.
2. Differentiated units within the social system (i.e., subsystems).
3. Interdependence among the subsystems identified in point No. 2.
4. The social system exhibits synergy (i.e., the social system is somehow more than and different than the sum of its parts). Further, there is an interdependent relationship between the social system and the subsystems comprising it.
5. A unilinear development of social systems, often evolutionary.

In the organismic model of society, there are a variety of units (element No.2 in the model) that make up the social system. Families, churches, businesses, and political institutions are among the more important of these units. These units are systematically interrelated (element No.3 of the model), performing functionally for one another. For example, political agencies provide law and order, making it possible for orderly businesses to exist. In turn, businesses provide the material goods necessary to sustain those individuals working for political institutions.

The units discussed in the previous paragraph are integrated into differentiated subsystems. In the classical presentation of the structural functionalist position, Parsons, et al, (1953) argue that there are four major subsystems performing separate functions:

1. Adaptation--This subsystem is synonymous with the economy and has the function of adapting to the physical environment (i.e., production).
2. Goal Attainment--This subsystem, which is synonymous with the political system, has responsibility for collective goal attainment which is in the national interest or the collective interest of the individuals in the social system.
3. Integration--This subsystem has the responsibility for maintaining differentiated norms and rules; this is visible as legal institutions, such as courts, the legal profession, and the police.
4. Latent Pattern Maintenance--This subsystem has the responsibility of sustaining the general cultural values of the society. Among others, religious institutions are included here (Bottomore, 1976).

Each of these subsystems is made up of smaller units. For example, the adaptation subsystem is comprised of a variety of organizations in the public and private sectors. The firms of the private sector perform an adaptation function primarily, though they perform the other three functions to a lesser degree. A similar division of the goal attainment, integration and latent pattern maintenance subsystem is possible as well.

Provided the subsystems and key units continue to perform their functions, society's continued existence and growth proves non-problematic. The possibility of dysfunctions does exist, however. If severe enough, dysfunctions may threaten equilibrium and the well-being of the entire society. Because society is seen as a system of self-regulating and interdependent units, dysfunctions are seen to emerge from exogenous factors. Overall, this theory of society sees social systems as moving in the direction of increased efficiency and growth in general (see No.5 in the model).

This social theory takes a distinct stance on several issues immediately relevant to a study of the diffusion of agricultural innovations: political power, the importance of the diffusion of agricultural innovations, and the role of social scientists in the diffusion process. Political power is seen as dispersed among many centers (Chilcote and Edelstein, 1974). Political power is awarded to individuals on the basis of achievement, for the good of the social system. There exists a set of mechanisms to replace

those threatening society's well-being if holders of power prove dysfunctional. [5] Barring overt and severe resistance to the holders of political power, it is assumed that the goal attainment subsystem is functioning well. The emergence of conflict demands either more effective means of socialization and social control or changes in the polity. More often than not, the problem is seen to be one of social control (Horton and Leslie, 1960; Reynolds and Henslin, 1973). The ideal polity makes use of the power invested in it to pursue the interests of the social system through the most effective means available.

From this theoretical perspective, the diffusion of agricultural innovations has the potential to transform agricultural production for the good of the entire society, and for the well-being of individual farmers. By reducing labor time and the drudgery of farm work, the lives of farmers improve. Further, by increasing productivity per unit labor time and per acre, farmers are able to earn more money and raise their standard of living. At the same time, farm production is important to the larger adaptation subsystem. By making farming methods more efficient, the material sustenance of the entire social system is facilitated. The diffusion of agricultural innovations has contributed, and continues to contribute, to the well-being of farmers and to the economic development of the United States (Guither, 1972). [6] From these arguments, increasing the productivity of agriculture is synonymous with progress and is beneficent for all of society (Buttel and Flinn, 1978). As the polity performs the goal attainment function, a functional polity promotes and facilitates the diffusion of agricultural innovation if at all possible.

It is likely that social scientists could prove useful in the process of diffusing agricultural innovations for several reasons. By gaining an understanding of the diffusion process and explaining this to change agents (public or private sector change agencies), social scientists may be able to accelerate and increase efficiency in diffusion campaigns. Funded by political institutions (especially the USDA) and pursuing the common goal of progress, social scientists (especially rural sociologists) probe the diffusion process to that end. The discussion now turns to an exploration of the theory used by rural sociologists in their inquiry into the diffusion of agricultural innovation. Returning to the communications model, the elements and the relationships among the elements of the classical diffusion paradigm's model of

diffusion will be explored. In Diagram 1-1, the classical diffusion paradigm's version of the communications model is presented.

Diagram 1-1: The Classical Diffusion Paradigm's Model of Communications (Rogers and Shoemaker, 1971)

Elements in the S-M-C-R-E Model:	Source	Message	Channel	Receiver	Effects
Corresponding elements in the diffusion of innovations:	Inventors, scientists, change agents, or opinion leaders	Innovation (Perceived attributes, such as relative advantage, compatibility, etc.)	Communication channels (Mass media or interpersonal)	Memebers of a social system	Consequences over time 1. knowledge 2. attitude change

The elements of the model presented by Rogers and Shoemaker (1971) correspond to Shannon and Weaver's (1949) communication model presented earlier. However, Rogers and Shoemaker's version does show some minor modification. The source (Element No. 1), message (Element No. 3), channel (Element No. 4) and receiver (Element No. 6) are presented by Rogers and Shoemaker specifically. Element No. 2, the encoder, is the packaging and presentation of the innovation by change agents. In Rogers and Shoemaker's model, this would be subsumed under the message. Element No.5, the decoder, is the perception of the innovation by receivers and this would be subsumed under Rogers and Shoemaker's message as well. Feedback, the seventh element in Shannon and Weaver's model, is the equivalent of the element Rogers and Shoemaker refer to as effects.

The communications model Rogers and Shoemaker present is a specific example of Berlo's (1960) behaviorist model, where the source presents a stimulus to the receiver in an effort to elicit a desired behavioral response. The focus of this model is on the source's goal(s). The importance of the effects of communication is the extent to which they conform to the source's goal(s). If there is a lack of conformity, more effective means of eliciting the desired behavior may be sought.

In the diffusion of agricultural innovation, the change agent presents farmers with an innovation in hopes of eliciting adoption behavior. Each of the first four elements in the model could potentially affect the adoption decisions of individual farmers as well as overall adoption rates:

1. The degree of similarity (homophily) or difference (heterophily) between the change agent (the source) and the receivers (farmers) affects the farmer's perception of and receptivity to agricultural innovation.
2. The nature of the innovation, as perceived by potential adopters, determines a positive or negative evaluation of the innovation and therefore influences adoption decisions.
3. The channel used affects the efficiency of communication with farmers and therefore adoption decisions.
4. Finally, the characteristics of farmers and of the social systems in which they reside affect their receptivity to a given innovation (Rogers and Shoemaker, 1971).

The adoption of the above theoretical system rests on several fundamental assumptions and has some important implications for the study of the diffusion of innovations. It is assumed that in the diffusion process:

1. The total number of choices available to the source are known.
2. The response of the receiver is observable.
3. The cause of the response may be attributed to the source (Darnell and Brockriede, 1976).

Proponents of the classical diffusion paradigm never specifically theorize the origins of agricultural innovations (i.e., the choices available to the source). In meeting Assumption No.1, diffusionists adopt a technological determinant position: (a) "Technological development is a given which is self-generating and follows a single course; and (b) the process has effects outside itself usually referred to as social impacts" (Noble, 1977, p.6). The adoption of a technological determinist position precludes investigation into the various paths technological development might take. Instead, the optimistic view of technological development, noted in the preceeding discussion of the classical diffusion paradigm's theory of society, guides diffusionist's considerations of these issues. A political system, working to the benefit

of the entire social system, contributes to technological development leading towards increased productivity and efficiency in U.S. agriculture. While agricultural scientists invent new and better agricultural techniques and technologies, social scientists seek to understand and facilitate the actual diffusion of these innovations (i.e., improve the source's ability to communicate in terms of Shannon and Weaver's model).

The second assumption, that the response of the receiver is observable, is rather non-problematic. Whether or not a farmer adopts an innovation is readily visible to investigators. The third assumption, that the response may be attributed to the source's effects upon the receiver, is a bit more complicated, however. In making that assumption, it is assumed that "all individuals have equal access" to adoption (Havens, 1979). This precludes objective, material impediments to adoption for individuals or entire strata of farmers. Instead, the focus is on the cultural and psychological variables affecting the source's ability to communicate (i.e., elicit desired responses) with the receiver. Among those variables considered important are homophily, the farmers' perceptions of innovations, the socialization of farmers, and other variables of this nature.

The assumptions noted above became paradigmatic assumptions with the ascendancy of the classical diffusion paradigm. In making these common assumptions, rural sociologists were able to pursue vigorously specific aspects of the diffusion process, adding detail and clarity to the fundamental assumptions and concepts noted above. During periods in which paradigmatic assumptions go unchallenged, knowledge is added bit by bit like bricks to a wall, to the basic structure. In the succeeding discussion, the methodology developed by diffusionists and a synopsis of their findings are presented.

Rural sociologists, seeking to create and implement more effective diffusion campaigns, tended to correlate variables relevant to adoption behavior. The variables correlated were those identified by the diffusion theory discussed above. To avoid the pitfalls of (1) meta-theory, which tends to be incomprehensible and unrelated to concrete reality; and (2) raw empiricism, which is ill-directed and hard to interpret, Rogers and Shoemaker (1971) argued for Mertonian (Merton, 1968) middle ranged theory. This strategy permits investigators to pursue research that is

theoretically informed but at a low enough level of abstraction to be immediately relevant. It was hoped that with continued research and interpretation, a more abstract and complete theory would be developed (Rogers and Shoemaker, 1971).

Diffusionist research tended to use the individual as a unit of analysis and took the form of bivariate correlations between theoretically significant variables (Rogers and Shoemaker, 1971).[7] Rogers and Shoemaker (1971) compiled, interpreted, and offered a typology of the many diffusion studies conducted. Their efforts are reproduced in Table 1-1 (see page 17).

In reviewing Table 1-1, the focus of diffusionist research is observable. Table 4 studies, those correlating adoption behavior to characteristics (often social-psychological ones) of potential adopters, account for nearly 60 percent of all research. Further, the only other content specific category accounting for more than five percent of all diffusion studies (Type 7), investigates the effectiveness of communications channels. These studies (Type 4 and Type 7) were designed to guide the development of effective diffusion campaigns and represent nearly two-thirds of all studies when combined. The findings of the research compiled in Table 1-1 tend to conform to diffusionist expectations (Rogers and Shoemaker, 1971). Adoption rates did indeed vary with social-psychological attributes of farmers, socio-demographic attributes of farmers, cultural and attitudinal differences in social systems, and differences among change agents and the strategies they used. On the basis of these positive results and the paradigm's ability to generate fruitful research, the classical diffusion paradigm remained dominant for a number of years.

Before leaving this discussion of diffusionist research and methodology, some comments are presented regarding questions that were not addressed. As noted, diffusionists tend to adopt a technological determinist position which precludes a thorough investigation of the objective nature of technologies. It is assumed that technological development is guided by a internal logic towards greater efficiency and progress. The more important issue is to promote acceptance of technological innovation and progress in general. As a result, the farmers' subjective perceptions of agricultural innovation were studied (Type 1),

Table 1-1: A Summary and Typology of Diffusion Research

Type	Dependent Variable	Independent Variables	Unit of Analysis	Number and Percentage of Generalizations of This type in the MSU Diffusion Documents Center
1	Rate of adoption of an innovation in a social system	Attributes of innovations (e.g.,complexity, compatibility,etc.) as perceived by members of a system.	Innovations	82 (1.2%)
2	Rate of adoption of innovations in different social systems	System norms:characteristics of the social system (e.g.,concentration of opinion leadership);change agent variables (e.g.,their strategies of change); types of innovation-decisions.	Social systems	159 (2.3%)
3	Attributes of innovations as perceived by members of a social system (e.g., complexity, compatibility,etc.)	Innovativeness and other characteristics of members of a social system.	Members of a social system	0
4	Innovativeness of members of a social system	Characteristics of members (e.g., cosmopoliteness); system norms and other system variables; communication channel usage.	Members of a social system	3,974 (58.4%)
5	Earliness of knowing about an innovation by members of a social system	Characteristics of members (e.g., cosmopoliteness); system norms and other system variables; communication usage.	Members of a social system	301 (4.5%)
6	Opinion leadership in diffusing innovations	Characteristics of members (e.g., cosmopoliteness); system norms and other system variables; communication channel usage.	Members of a social system	220 (3.2%)
7	Communication channel use (e.g., whether mass media or interpersonal)	Innovativeness and other characteristics of members of a social system (e.g., cosmopoliteness); system norms; attributes of the innovations.	Members of a system (or the innovation-decision)	458 (6.7%)
8	Consequences of the innovation	Characteristics of members and the nature of the social system	Members or social systems	16 (0.2%)
	Others	--	--	1,601 (23.5%)
			Total	6,811 (100%)

(Rogers and Shoemaker, 1971, pp. 72-73)

but the objective attributes of innovations were not. In a similar vein, great stress was put on identifying social-psychological features of farmers open to progress (i.e., willing to adopt agricultural innovations). However, a thorough investigation of the objective, material differences among farmers (i.e., total income, total acreage, etc.) never emerged. Instead, diffusionists assume that all farmers have equal access to adopt innovations and that it is in the communication of innovations that the interesting questions lie.

As will be seen in the succeeding discussion, the silences of the diffusionist position are important to the critique. Diffusionist research ignores areas that critics consider essential. When studies into these areas were pursued, important anomolies emerged and have persisted. In Section 3, the logic behind these criticisms is presented.

Section 3

Having outlined the basic concepts and logic of the classical diffusion paradigm, the focus shifts to the objections raised to that position in recent years. There will be no attempt to include in this discussion all of the criticisms of the classical diffusion paradigm that have emerged in recent years. Instead, issues are addressed that are deemed fundamental to the diffusionist arguments. Therefore debates regarding the fundamental assumptions of the classical diffusion paradigm will be central in this discussion.

Though not presented in as great detail as the organismic model of society, a discussion of the conflict model of society will open this discussion. Critiques of the classical diffusion paradigm has been developed by adherents to a variety of theoretical positions. The form and the logic of their arguments exhibit, however, a general reliance upon the conflict model of society. The conflict model is presented here as a means of contrasting the logic of the classical diffusion paradigm and that of the critiques. From this discussion, diffusionists' assumptions that contradict the fundamental tenets of the conflict perspective will be identified. In turn, the debates centering around these fundamental assumptions of the classical diffusion paradigm will be summarized. Having identified and summarized key points of contention,

empirical investigations that shed light on these issues will be addressed in Section 4. Hopefully, this exposition will serve to identify the nature of the more important criticisms and to give the reader an opportunity to assess the degree to which the classical diffusion paradigm's credibility is undermined.

In Table 1-2, the conflict model is contrasted to the organismic model discussed earlier. In this discussion, theories modeled after an organism are referred to as order theories.

Table 1-2: A Contrast of Order and Conflict Views of Society

Order Prespective	Conflict Perspective
1. "Society as a natural boundary maintaining system of action," (Horton and Leslie, 1960, p.705)	1. "Society as a contested struggle," (Horton and Leslie, 1960, p.705)
2. Society made up of differentiated units.	2. Society made up of "groups with opposing views and aims," (Horton and Leslie, 1960, p. 705)
3. Interdependence among the units (see point 2) that make up society.	3. Groups that make up society (see point 2) caught up in intense and ongoing struggle.
4. "Transcendent nature of society; an entity sui generis, greater than and different from the sum of its parts; lack of transcendence as lack of social control means anomy,"(Horton and Leslie, 1960, p. 705)	4. "Immanent conception of society and the social relationship; men are society; society is the extension of man; transcendence of society is tantamount to the alienation of man from his own social nature," (Horton and Leslie, 1960, p.705)
5. Unilinear,often evolutionary,development of society.	5. Development of society is determined by the outcome of ongoing struggles.As such, it is not unilinear,but may follow a variety of paths; many of which are disastrous for some and/or all strata of society.

As can be seen in Table 1-2, the order perspective focuses on the interdependence and harmony among differentiated units, while the conflict perspective sees potentially destructive struggle as ubiquitous. The order perspective sees differences in social roles as beneficial for the whole and for the units, in a manner analagous to organs of animals. From this perspective, the fact that some groups in society are relatively better off in terms of money, power and life chances is seen as inevitable, and for the most part, functional. As discussed earlier, this fundamental logic directed the diffusionist analysis of political power, emphasized the importance of the diffusion of agricultural innovation and established the role of social scientists in the diffusion process. In the succeeding discussion, conflict theorists' challenges to these assumptions will be summarized.

Diffusionists, like others of the order prespective, view existing power relations, power structures, and political institutions as functional and therefore as something to be supported and maintained (Reynolds and Henslin, 1973). In the conflict perspective, the acquisition of political power is the outcome of a struggle among opposing groups. That those in power use that power for the good of the whole society is unlikely, if not impossible. It is much more likely that those in power use it in pursuit of their groups interests and for their own personal ends. Conflict theorists reject the notion that society somehow has self-regulating mechanisms that curb abuses of political power. It is argued instead that those in power use that power to mask their abuses and to entrench their positions.

From the conflict perspective, the diffusion of agricultural innovations is a political event. Research, development, and diffusion of agricultural innovations is in part funded and organized by the state. In contrast to the diffusionist position, where it is argued that society in general as well as individual farmers, are benefitted in the process, conflict theorists hypothesize that some groups would benefit while others are harmed. Biases in research, development, and diffusion on the one hand, and differences in the relative market position of potential adopters on the other, become foci of inquiry for conflict theorists. As a consequence, for conflict theorists the role of social scientists is not to implement state policy unquestioningly, but to investigate critically the origins of that policy and its likely impact upon various social

groups (Bottomore, 1976). In pursuing the line of research dictated by the logic of the conflict perspective, key assumptions in the order theorists' view of the diffusion were challenged as well.

As noted, diffusionists adopted a technological determinist position (i.e., technological development is a given, which is self-generating and follows a single course) and can thereby justify the neglect of research into the origins of technologies. For conflict theorists, the research, development and diffusion of agricultural innovations is a political event in which certain groups make use of the political power they enjoy to direct technological development to their own ends. Conflict theorists investigate funding allocations for evidence of biases in the research and development agenda of the United States. Further, the actual technologies are treated as variables, with objective differences. That technologies have objective differences has important consequences in the diffusion process. In particular, conflict theorists argue that the scale of technologies and the capital requirements for adoption tend to favor a given stratum of farmers. As diffusionists neglect investigation of the objective attributes of innovations and of the farmer's relative market position (defined by objective criteria) their ability to come to grips with biases in the diffusion of agricultural innovations is crippled.

With the rejection of technological determinism, key assumptions justifying the use of the diffusionists' communication model are challenged as well. Darnell and Brockriede (1976) assert that the use of Shannon and Weaver's communication model for the study of people is justifiable if and only if the following three assumptions are met:

1. The total number of choices available to the source are known.
2. The response of the receiver is observable.
3. The cause of the receiver's response may be attributed to the source.

Technological development is seen by conflict theorists as a product of political struggle, the outcome of which determines the direction technological development takes. As such the technology diffused by a change agency (source) at any one time represents one of many possible alternatives. In fact, technologies that were never developed due to biases in research and development prioritization must be

considered possible alternatives. While it may be possible to estimate the possible choices available to the source, it is clear that diffusionists ignored this issue entirely. Instead, it was implicitly assumed that the technologies diffused were the only ones possible. In turn, this leads diffusionists to overlook the objective attributes of innovation. As diffusionists see technological development occurring according to its own logic and largely synonymous with progress, the objective attributes of technologies are of minor importance. Instead, the social-psychological differences among farmers, especially those indicating an acceptance or rejection of progress, are thought to be of much greater importance.

The second assumption (i.e., observability of the response) is non problematic but conflict theorists deny that the receiver's response (i.e., farmer's adoption decisions) may be attributed to the source. In challenging this third assumption, conflict theorists suggest a variety of factors that could prove more important than the communication between the change agency and the farmer. Among the more important of these factors is the variation in objective constraints to adoption faced by various strata of farmers. Depending upon the capital requirements and scale of a given innovation, those farmers with ready access to capital and operating large-scale farms are at an advantage. In instances where technologies are inappropriate or inaccessible for a given farmer, the activities of the source (i.e., change agency) is of minor importance in "causing" the farmer's response to that innovation. The diffusionists are unable to fully explore these situations due to the communications model that structures their theory. In that model, the focus is restricted to the source's goals and effectiveness. Factors that structure technological development and the actual diffusion process cannot be integrated into that model and are therefore left untheorized.

In the conflict theorists' problematic, the consequences of the diffusion of agricultural innovations are important. Unlike the diffusionists who measure aggregate increases in productivity and efficiency in an effort to assess progress, conflict theorists study the consequences to find which groups are hurt and which are helped. The outcome of the diffusion process is not viewed as inherently beneficial. The desirability of the outcome depends on one's location in society and the degree to which one's group is harmed or benefitted in that process.

Conflict theorists challenge paradigmatic assumptions of diffusionist thought. A search for evidence supportive of conflict theorists' arguments is hampered and quite likely impossible using diffusionist methodology. The reader is reminded that diffusion research relied on bivariate correlations that were interpreted according to diffusionist logic. The challenging of paradigmatic assumptions makes the interpretation of existing studies and the design of future ones problematic. For example, the positive correlation between a positive orientation towards modernization and adoption propensity was a finding often replicated in diffusion research. If it is assumed that there is only one path of technological development (which is largely synonymous with progress) and all farmers have equal access to adopt innovations, then that finding is useful and informative. Those farmers approving of modernization will be more receptive to change agents' communications and more likely to adopt. If, however, technological development is seen as a political event whose course impacts various groups differently, the correlation between attitudes and adoption behavior becomes less informative. One is left wondering if the correlation between attitudes and adoption behavior is a function of objective, material factors. More specifically, better capitalized farmers who tend to have a positive orientation towards modernization also have better access to technologies available. In fact, the positive attitude towards modernization may well emerge from the fact that better capitalized farmers are in a position to profit from the present path of technological development.

On this and a variety of other issues noted above, the classical diffusion paradigm does not develop the concepts nor the methodology to guide the conflict theorists' research into fundamental assumptions of the diffusionists' argument. Critics, however, did develop alternative methodologies, and the results of their research point to important anomolies in the classical diffusion paradigm. This empirical evidence will be presented in Section 4.

Section 4

Recent empirical investigation is considered in this section, making use of the preceding discussion of criticisms of the classical diffusion paradigm's assumptions, logic, and methodologies. In this discussion, studies will be selected and reviewed according to their

potential of shedding light on the issues discussed above. The discussion will be ordered as follows:

1. Biases in U.S. technological development.
2. Importance of the objective attributes of innovations.
3. Importance of the relative market position of potential adopters in the diffusion process.
4. Consequences of the diffusion of agricultural innovations.

The technological determinist position implies that scientists operate with considerable autonomy and that their research is guided by factors endogenous to science. With regard to present arguments, this implies that diffusionists see U.S. agricultural research and development guided by the logic of science, not by exogenous factors. Busch and Lacy (1978), however, provide evidence that exogenous factors shape agricultural research and development, considerably more than diffusionists imagine. Agricultural scientists interviewed by Busch and Lacy reported that funding was the most important factor in their selection of research problems.[8] The scientists interviewed by Busch and Lacy reported that funding availability was more important than the scientist's own evaluation of the problem or of his/her own research interests.

From the conflict perspective, it becomes important to identify who controls funding sources that determine agricultural research and development prioritization. Further, it is necessary to identify the interests being pursued by those controlling research funding. Busch and Lacy (1978) report that commodity groups usually representing the interests of corporate agribusiness and the largest farmers, were considered the most influential group in controlling research and development. In related research, other authors have offered evidence that the American Farm Bureau Federation (Hightower, 1973; Ford, 1973; McConnell, 1953) and agribusinesses (Hightower, 1973) have the ability to shape agricultural research and development to serve their own ends. These groups have access to political power and can shape state policy concerning research and development. They also have the financial resources to finance research on their own. The objective here is not to specify the constellation of

political forces that shape U.S. agricultural research and development but to point out that there is empirical evidence that exogenous factors shape agricultural research to a greater degree than diffusionists expect. In this regard the technological determinist position adopted by diffusionists is contradicted.

Each of the groups identified above as potentially influential in shaping agricultural research and development has an interest in expanding the scale of agriculture and its associated capital requirements. As such, it is expected by conflict theorists that agricultural research and development and the technological inventory would reflect a bias in that direction (Buttel and Flinn, 1977). Capital requirements and the scale of technologies are examples of objective attributes of innovations. The importance of objective attributes of innovations to the diffusion process is the topic of the succeeding discussion.

Objective attributes of innovations are objective by virtue of the fact that they are observable, not perceptions in the minds of individuals. Some important examples of objective attributes of an innovation include the capital intensity, scale, and availability of that innovation. Technologies may be compared with one another on the basis of objective measurement of these attributes. Yapa (1977) developed a framework for measuring the importance of objective attributes of agricultural innovations in the diffusion process. In using this framework (Yapa and Mayfield, 1978), it was found that the objective attributes of technology being diffused, especially capital requirements and scale, were of greater importance in explaining adoption behavior than were factors deemed important by diffusionists. Though Yapa and Mayfield's study was performed in India, they did demonstrate the soundness of a logic and the utility of a methodology that contradicts diffusionist recommendations. Building on that logic, Brown (1979) demonstrated the importance of information and infrastructure in the diffusion of innovations in the United States. Brown (1979) argues convincingly that change agencies select the farmers who will have an opportunity to adopt, and to select among those who will have the opportunity, giving some groups a relative advantage.[9]

Objective differences among innovations is only one side of the coin. Critics of the classical diffusion paradigm argue that there are objective differences among farmers as well (i.e., variance in their relative market position). Farmers vary with regards to their access to material prerequisites to adoption; most importantly adequate capital, information, and the size and type of operation appropriate for a given technology. Given the tendency towards high-scale, capital-intensive technology noted earlier, conflict theorists expect farmers operating larger and better capitalized farms to be at a relative advantage in the diffusion process.

Some empirical studies do indicate the importance of a farmer's relative market position in determining adoption decisions. Havens and Flinn (1975) report on one example in Colombia where farmers varied in their access to material prerequisites for adoption. For those farmers without access to prerequisites, especially capital, their attitudes and the communication strategies of change agencies proved immaterial to their adoption decisions. They lacked the resources necessary for adoption and had no decision to make. In related research, Aikens and others (1975) used path analysis to inspect the relative importance of variables correlated with adoption. Though the correlations hypothesized by diffusionists were found (i.e., positive attitudes towards modernity, cosmopoliteness, and a variety of socio-demographic variables), variables specifying relative market position were of greater importance in explaining adoption behavior. These studies were performed in Colombia and cannot be used as evidence of conditions in the United States. They do, however, present evidence supportive of the logic of conflict theorists and point to a workable methodology of testing the fundamental assumptions challenged by critics of the classical diffusion paradigm.

Critics of the classical diffusion paradigm have also investigated the consequences of the diffusion process. In contrast to diffusionist methodologies where aggregate changes in productivity or in total value of harvest were used as a measure of consequences, Goss (1976) studied the impact of diffusion on various groups in society as well. Consistent with diffusionist findings, Goss reports that the diffusion of agricultural innovations in the United States has led to:

1. Increased productivity per worker.
2. Increased productivity per acre.
3. A net increase in total agricultural production.
4. Increased aggregate income to farm families.

However, Goss reports several other consequences that were ignored by diffusionists and to some degree contradict diffusionist assumptions:

1. Concentration of farm production and sales.
2. Centralization of farm production and sales.
3. Labor displacement.
4. New health and safety dangers for farm workers.
5. Net out-migration of farm population (Goss, 1976).

Goss's findings challenge the diffusionist assumption that technological development is uni-directional and synonymous with progress. His findings that some groups are hurt by the diffusion of agricultural innovations while others are benefitted is largely consistent with conflict theorists' arguments concerning research and development, objective attributes of innovations, and the relative market positions of farmers. Given the mixed blessings that technological development brings, the diffusionist tendency to unquestioningly support and facilitate existing policies regarding technological development is called into question. Daryl Hobbs (1979) made this point in his recent inaugural address, "It should be clear, for example, that rural sociologists' research on diffusion had significant policy implications, both internationally and domestically. It was advocacy research, whether intended or not." Diffusionists are, however, at a loss to critically explore technological development policy issues due to their technological determinist stance and their optimistic view of the polity.

This section and the preceeding one have outlined the logic of conflict theorists' critique of the classical diffusion paradigm, as well as some representative research that supports their arguments. In closing, it is noted that the arguments put forth by conflict theorists appear logically consistent as far as they go and have indeed been supported by empirical studies cited here. The task of evaluating the importance of their critique and the anomolies noted in the classical diffusion paradigm is left for the fifth and concluding section of the chapter.

Section 5

In this section, the validity of the criticisms of the classical diffusion paradigm will be evaluated, and suggestions as to what needs to be done will be offered. The criteria used in this evaluation are those suggested by Kaplan (1964) and Kuhn (1962). Kaplan's thesis is that sociological theories are valid to the extent that they are useful in sociological inquiry. To a certain extent, Kaplan demands theories be "truthful", but that may be understood as "not obviously false." As social theories are often complex and abstract, demanding absolute and a priori truthfulness tends to impede sociological investigation instead of helping. Kaplan's emphasis is more pragmatic. He seeks a theory to organize and direct social inquiry. If a theory is logically consistent, appropriate for the problem at hand, not obviously false, and is useful in sociological investigation, that theory is acceptable by Kaplan's standards.

At the level of a paradigm, a similar commentary is offered by Kuhn (1962), who argues that a paradigm's utility is in its ability to organize research on a given phenomena. To the extent that its models, theories, and methodologies continue to exhibit advantages in the study of a given phenomena, that paradigm's dominance tends to go unchallenged. With the emergence of anomolies that contradict fundamental assumptions and remain inexplicable with the paradigm's theories and methodologies, the paradigm's dominance is threatened. Kuhn (1962) argues that a paradigm's fate does not necessarily hinge on its truthfulness in an absolute sense, though that is important to some degree. Rather, a paradigm is assessed according to its utility in scientific investigation.

The goal of the present effort is to facilitate sociological inquiry into the diffusion of agricultural innovations. To that end, the pragmatic criteria advanced by Kaplan and Kuhn serve the present purposes well. The classical diffusion paradigm will be evaluated according to its utility in guiding research and in interpreting existing studies into the diffusion of agricultural innovations. Suggestions as to what needs to be done will be guided by the same concerns and criteria. The discussion will begin with a consideration of the (in)validity of the classical diffusion paradigm's fundamental assumptions on the basis of empirical evidence. Based on this discussion

a consideration of the classical diffusion paradigm's models and theories for the study of diffusion of agricultural innovations will be presented. Finally, the utility of the paradigm in sociological inquiry will be addressed and suggestions offered.

In Sections 3 and 4, challenges to the classical diffusion paradigm's fundamental assumptions were discussed. At the level of society in general, the diffusionist's view of a cooperative and harmonious society was challenged on several fronts. Instead of being guided by endogenous logic and funded by a neutral polity, agricultural research and development was shown to be an arena of conflict with observable biases. The results of these biases were identified at the level of objective attributes of technologies developed and the consequences of agricultural innovation. Instead of being equally available and beneficial for all concerned, U.S. technological development appears to be a blessing for some while harming others. At the level of the actual diffusion process, the notion that the communication of innovations is primary in shaping the diffusion process has been challenged as well. Arguments, bolstered by empirical evidence, point to objective factors (i.e., objective attributes of technologies and the relative market position of farmers) that are relatively more important than communication variables in the diffusion process.

In addition to casting doubt on the paradigm's truthfulness, challenging the fundamental assumptions of the classical diffusion paradigm calls into question the appropriateness of the models used. At the level of society in general and of diffusion specifically, diffusionists make use of models that point to functional and harmonious relations among social actors. To the extent that these models accurately represent social reality, their use by diffusionists serves to facilitate sociological inquiry. If, however, the picture of society that they paint is inaccurate, their use tends to impede social inquiry by distorting social reality and restricting social inquiry to issues likely to be sterile. The arguments of the classical diffusion paradigm's critics have been supported by some empirical evidence and do call into question the appropriateness of the models that structure diffusionist thought. Therefore, not only is the accuracy of the diffusionist's hypotheses on specific issues called into question,but their approach to sociological inquiry in general becomes problematic.

The assumptions that have been challenged in recent years are fundamental to the diffusionist position. On the basis of making these assumptions, diffusionists were able to make use of powerful and easily understood models to pursue a very concrete and applied research agends. The arguments and findings noted above represent anomolies that need explanation. Though the anomolies discussed do not prove that the classical diffusion paradigm is false, they do raise questions that cannot be ignored. To this point, diffusionists have not advanced satisfactory explanations. This detracts further from the paradigm's credibility and utility.

The eroded credibility of the classical diffusion paradigm is reflected in the arena of research and methodology as well. Relying on the assumptions noted above, diffusion research based on bivariate correlations was both focused and easily interpreted. With the fundamental assumptions under fire, that research proves inconclusive and unsatisfactory in resolving emerging debate. It is presently unclear whether the social-psychological variables diffusionists correlated with adoption behavior have a spurious, intervening, or casual relationship with adoption behavior. The correlations between communication variables (i.e., communications channels used, homophily, etc.) are equally difficult to understand. In the wake of the criticisms noted above, the vast body of diffusionist research findings are revealed to be of doubtful utility to researchers. In a related vein, the diffusionist methodologies prove ineffective in guiding research to resolve the classical diffusion paradigm's crisis. Social scientists are reluctant to employ the logic or the methodology of the classical diffusion paradigm in resolving the crisis in that paradigm.

Recalling earlier comments, the utility of the classical diffusion paradigm in guiding sociological inquiry is central to the present evaluation. In that light, the fact that diffusionist's logic and methodology appears to be of little utility in resolving the present crisis is the most indicting of charges. Social scientists of diverse theoretical orientations, including authors noted for their contribution to the diffusionist literature (see especially Rogers, 1976 and Buttel and Flinn, 1978) note the paradigm's failings in this regard. The importance and the persistence of the anomolies noted above indicate the severity of the crisis and the necessity of doing something about it.

Kuhn (1962) notes that the resolution of paradigmatic crises often hinges on the emergence and acceptance of alternative perspectives. As such, the resolution of the crisis in the classical diffusion paradigm may well hinge upon the construction of alternative models, theories and methodologies. While the "facts" and "laws" that diffusionist research has verified cannot be ignored, a more acceptable theoretical framework for studying the diffusion of agricultural technologies must face squarely the arguments and empirical evidence critics have advanced in recent years. Specifically, this would imply that an acceptable alternative must consider:

1. The political and conflictual aspects of the research, development and diffusion of agricultural technologies.

2. Biases in the research and development infrastructure of the U.S.

3. The objective attributes of technologies and the importance of objective attributes in the diffusion process.

4. The objective differences among farmers (i.e., the relative market position of farmers) and the importance of these differences in the diffusion process.

5. The consequences of the diffusion of agricultural innovations (positive and negative; intended and unintended) for individuals, social groups and for the entire society.

The issues raised by the critics of the classical diffusion paradigm point to the importance of situating the diffusion of agricultural innovations within a larger social structure--one that is not necessarily harmonious nor made up of functionally interdependent units. Given the complexity of the undertaking, it would seem advisable for social scientists to be deliberately conscious of the theories and models employed in sociological inquiry into the diffusion of agricultural innovations. There already exists a vast assortment of "facts" and "laws" concerning the diffusion of agricultural innovations. What is needed is a theoretical framework of sufficient breadth and power to integrate and explain those confusing and seemingly contradictory empirical phenomena.

FOOTNOTES - Chapter 1

1. The definition of theory offered here is that presented by Dr. Saad Nagi in a course on theory construction and verification at the Ohio State University.

2. The definition of paradigms offered here is that presented by Dr. Saad Nagi in a course on theory construction and verification at the Ohio State University.

3. See Newby (1980) for a discussion of the historical events that contributed to the atheoretical and at times anti-theoretical position adopted by rural sociologists in the U.S.

4. Rogers and Shoemaker (1971) attempted to integrate many studies which they characterized as 'raw empiricism' using middle-ranged theory. In their bibliography, their reliance upon diffusionist and functionalist theory is evidenced. The following names were among those cited: DeFleur, Berlo, Blau, Homans, Katz, Lazarsfield, Lerner, Merton, Parsons, Pye, Radcliffe-Brown, Schramm, and Shultz.

5. Parsons (1967) offers the classical statement of the diffusionist view of the polity. In this work, Parsons uses an economic analogy where citizens invest their own power (analogous to money in the economy) in the legitimate political institutions. Political elites use the resources at their disposal to achieve the goals of the larger society and of their immediate constituencies. As economic institutions make use of money that is voluntarily given to them as savings to provide the material pre-requisites of society, political institutions make use of the power that is voluntarily given to them to provide the organizational pre-requisites of society.

6. Guither (1972) argues that technological development in U.S. agriculture contributed to the development of the larger U.S. economy in the following dimensions:
   a) Increased food supply at lower prices-Not only is a larger industrial labor force supported by the agricultural sector, but workers need spend less on necessary food and fiber products.
   b) Transfer of manpower to industry-With less labor required on the farm, the U.S. sector had the opportunity to make use of the laborers freed up.
   c) Increased capital accumulation-Increased farm production facilitated capital accumulation via (1) savings and investments by farmers enjoying increased income; (2) savings of the urban population paying less for food and fiber and (3) taxes on the land which permitted the government to make investments or to aid private industry.
   d) Increased purchases from abroad-Expansion of farm exports made funds available for purchases of foreign goods or the repayment of debts.
   e) Increased demand for industrial products-Farmers with larger yields and incomes are better able to buy consumer goods and production items. Farmers have moved away from self-sufficiency and towards consumerism. By that movement they have sparked other sectors of the economy.

   Guither, like most diffusionists, sees technological development as synonomous with progress and economic development as a harmonious process. As will be detailed in later discussions, critics object to this optimistic picture.

7. Actually many diffusion studies were not designed according to Mertonian middle-ranged theory. As previously noted, much of the early diffusion work was atheoretical if not anti-theoretical. Recalling an earlier argument, it may be concluded that diffusionists did intuitively follow the logic of the classical diffusion paradigm, even if unconsciously. That Rogers and Shoemaker (1971) were effective in organizing the many raw empiricist studies in a middle-ranged framework attests to their common logic.

8. Rogers and Shoemaker (1971) argue that the consequences of the diffusion of innovations have received far too little attention. However, they view the problem as caused by the reluctance of funding sources to finance such studies, not as a complete oversight due to the disinterest of investigators. These arguments are similar to those presented by Busch and Lacy (1978) and point to a potentially fruitful line of future inquiry: the degree to which funding availability contributed to the ascendancy and prolonged dominance of the classical diffusion paradigm.

9. From the logic of the classical diffusion paradigm the two-step flow of communications model was developed. In that model, communications in general (agricultural innovations in particular) were seen as diffusing in two steps. First, the more innovative individuals would accept the innovation. They would then serve as models and informal change agents for more hesitant peers. From this logic, it became adviseable for change agencies to focus on 'innovative' farmers first and reach other farmers through the earliest adopters. Brown (1979), however, argues that this represents still another advantage enjoyed by larger and better capitalized farmers, becuase it is this group of farmers that are seen as 'innovative'. Thus, the classical diffusion paradigm is not only seen as inaccurate by Brown but as actually contributing to the magnification of existing disparities when applied in diffusion campaigns.

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